Crime Mapping in the National Forests

Michael G. Wing - Oregon State University
Joanne F. Tynon - Oregon State University
Bob Shuker - USDA Forest Service

Objectives

- Use the USDA FS Region 6 database (LEIMARS) to explore crime incident locations in relation to other geographic features
  - **do patterns exist in the spatial distribution of crime and are observable patterns influenced by other landscape features?**
- Examine how crime violation types are distributed at various administrative levels in the FS
  - **regional, forest, and special management unit level**

LEIMARS database

- Law Enforcement and Investigations Attainment Reporting System

- Best, and only available, source of crime statistics for national forests and grasslands in the US
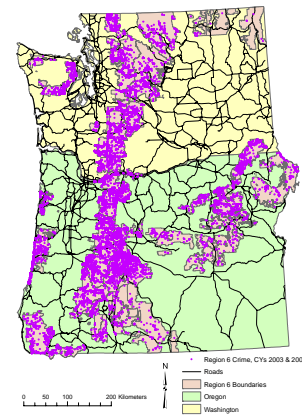 - **193 million acres**

Methods

- Layers:
  - LEIMARS data for Region 6 (CY 2003 & 2004)
  - Transportation networks
  - National forest boundaries
  - Hydrology
  - Elevation
  - Digital orthophotographs
- Registered all spatial data layers to a common map projection
- ArcMap GIS
  - Exploratory visual analysis

USDA Forest Service Region 6

- 43,396 sq. miles of National Forests and Grasslands in Washington & Oregon

- 14.4% of the entire FS system

- Over 45,000 spatially referenced crime incidents for Region 6

- 40,003 crimes in Region 6 boundary

USDA FS
Region 6

Region 6 Crime, CYs 2003 & 2004
Roads
Region 6 Boundaries
Oregon
Washington

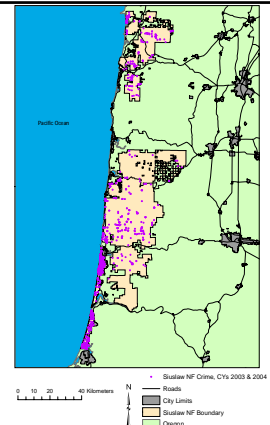0   50   100   200 Kilometers

Siuslaw National Forest

- Area within forest boundary is approximately 1292 sq. miles
  - Removing private inholdings from estimate results in approximately 979 sq. miles
- 4763 logged crimes within the Siuslaw National Forest during CYs 2003 and 2004
  - 11.9% of all crimes reported in Region 6
- Siuslaw National Forest draws an estimated 1,864,268 visitors per year
  - 6.6% of total Region 6 visitors

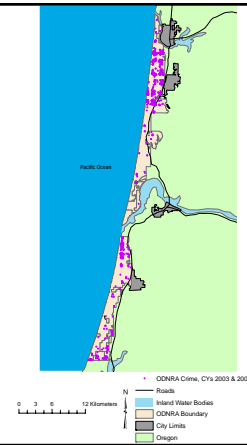

USDA FS Region 6

Siuslaw National Forest

Oregon Dunes
National Recreation Area

- Approximately 54 sq. miles
  - Or, approximately 48 sq. miles after private inholdings removed

- 2114 crimes logged in the ODNRA
  - represents 44.4% of all crimes reported in the Siuslaw National Forest, or
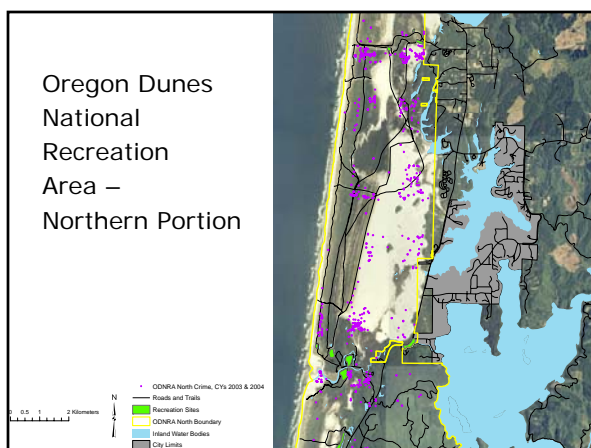 - 5.3% of all crimes in Region 6

USDA FS Region 6
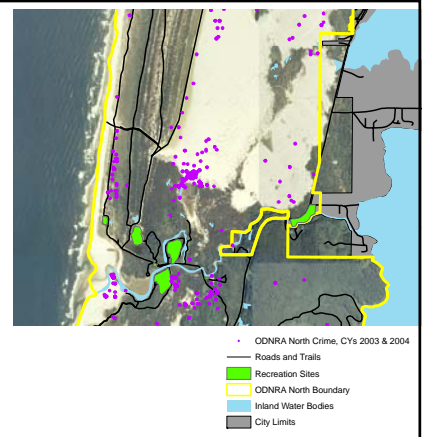
Siuslaw National Forest

Oregon Dunes NRA

Oregon Dunes National Recreation Area – Northern Portion

ODNRA – North:

A closer look assisted by DOQ and DEM

LEIMARS Violation Levels

- Administration
- Civil
- Felony
- Infraction
- Misdemeanor
- Noncriminal
- Petty offense

LEIMARS VIOLATION LEVELS

Violation Level	Region 6	Siuslaw NF	ODNRA
Administrative	0.1% (34)	0.0% (0)	0.0% (0)
Civil	0.1% (27)	0.0% (2)	0.0% (0)
Felony	1.4% (552)	1.0% (49)	0.4% (9)
Infraction	7.6% (3023)	4.0% (191)	2.6% (55)
Misdemeanor	88.6% (35,462)	91.9% (4376)	92.1% (1946)
Noncriminal	2.0% (797)	3.0% (144)	4.9% (103)
Petty offense	0.3% (108)	0.0% (1)	0.0% (1)
(Totals)	(40,003)	(4763)	(2114)

GIS Contributions to USDA FS

- as a decision support tool

- to direct crime prevention and mitigation resources

- to better understand the relationship between natural resources and crime occurrence

Database Issues

- 5721 crime points associated with Region 6 located outside forest boundaries
  - 12.5% of the total crimes logged in CYs 2003 and 2004
  - Outside distance ranged from 3.3 feet to 71.5 miles
    - Average distance of 3.4 miles
- Some location discrepancies can likely be attributed to incorrect data entry or map interpretation
  - Digital field input using GPS could help alleviate spatial registration problems
  - A one degree error in entering a latitude coordinate results in an error of approximately 69 miles
- Other database issues
  - Data entered in the wrong columns
  - Incomplete data
  - Data had incorrect numeric references

Future Research

- Fewer points = Fewer crimes?

- Access and crime

- Crime concealment

- Proximity of crime occurrence to law enforcement offices

Future Research, continued

- Geographic profiling

- Crime forecasting/prediction

- Spatial displacement of offenders

- Compare FS and non-FS crime

- Causality in relation to environmental factors

The Future?

The USDA Forest Service has the opportunity to lead the way in developing a model for the cataloguing and analysis of spatially referenced crime events in natural resource settings…

Thank you

Michael G. Wing - Oregon State University
Joanne F. Tynon - Oregon State University
Bob Shuker - USDA Forest Service